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Intensionality and Propositionalism

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intensional constructions, intensional transitive verbs, attitude reports, clausal embedding, sententialism, lexical paraphrase, information content

Abstract

Propositionalism is the view that all intensional constructions (including nominal and clausal attitude reports) can be interpreted as relations to truth-evaluable propositional content. While propositionalism has long been silently assumed in semantics and the philosophy of language, it has only recently entered center stage in linguistic research. This article surveys the properties of intensional constructions, which require the introduction of fine-grained semantic values (intensions). It contrasts two ways of obtaining such values: through the introduction of either Russellian propositions or Frege-Church-style senses. The article identifies propositionalism with a specific variant of the Russellian strategy, reviews key arguments for propositionalism, and compares familiar varieties of propositionalism on the basis of instructive examples. It closes by discussing various challenges for propositionalism and suggesting a generalization of propositionalism that meets some of these challenges. Because of the association of propositions with semantic information, the article also addresses the more general question of whether all information content (including mental and pictorial content) is propositional.



Coextensionality:
having the same referent (coreferentiality) or the same truth value (material equivalence)

(Referential) Transparency: the property of permitting substitution of coextensional expressions

1. INTRODUCTION

Propositionalism is the view that all intensional constructions, like examples 1a–c, can be interpreted as relations to truth-evaluable propositional content. Propositionalism has long been a working assumption in semantics and the philosophy of language (see Hintikka 1969, Montague 1974, Quine 1956, Russell 1903). However, following Forbes (2000)—and sparked by a growing interest in natural language ontology—it has only established itself as a topic for discussion in the last 25 years (see, e.g., Grzankowski 2016; Larson 2002; Montague 2007; Parsons 1997; Sinhababu 2015; Szabó 2005; Zimmermann 1993, 2016).

- | | | |
|------|---|--------------------|
| (1a) | Ralph believes [_{CP} that Orcutt is a spy]. | (Quine 1960) |
| (1b) | I want [(to have) [_{DP} a sloop]]. | (Quine 1956, 1960) |
| (1c) | Penny painted [_{DP} a penguin]. | (Zimmermann 2016) |

This article surveys the particular properties of intensional constructions: constructions that require the introduction of fine-grained semantic values (i.e., intensions). It contrasts two different ways of obtaining such values—through the introduction of either Russellian propositions or Frege-Church-style senses (described below)—and identifies propositionism with a specific variant of the Russellian route (Section 2). To show what is at stake in the debate about propositionism, Section 3 reviews the key arguments for propositionism. The remainder of the article discusses some specific propositionist analyses. To this end, in Section 4 it describes the familiar varieties of propositionism—sententialism (Larson 2002), paraphrasism (Quine 1956), and type-shifting (Kaplan 1976)—and, in Section 5, compares them on the basis of some notorious examples (including examples 1b and c). The article closes by discussing several challenges for propositionism and suggesting a generalization of propositionism that meets some of these challenges. To prepare my discussion of propositionism, I start with some background and terminology.

2. BACKGROUND

2.1. Intensional Constructions

Referentialist semantics defines linguistic meaning in terms of truth and reference: The referent of an expression is the particular entity that is picked out by this expression (in a given circumstance of evaluation). This entity can be an individual object [in the case of proper names and referential determiner phrases (DPs); see example 2] or a set or class of objects (in the case of nouns, adjectives, and intransitive verbs; see example 3). An expression is referential if it has a referent; two expressions are coreferential if they have the same referent (in a given circumstance of evaluation). Since declarative sentences refer neither to individual objects nor to their sets, referentialism identifies sentence meaning with truth conditions—that is, with the circumstances under which these sentences are true. An expression is truth-evaluable if it has truth conditions; two expressions are materially equivalent if they are true given the same circumstance. Following Carnap (1988), the referential meaning of an expression is called its extension. Two expressions are coextensional if they are either coreferential or materially equivalent.

Examples 2 and 3 (due to Ede Zimmermann) illustrate the above notions. The coextensionality judgments in these examples are based on the comic shown in **Figure 1**:

- (2) $[[\text{Penny}]] = [[\text{the speaker}]] = \text{Figure 1b}$
 (3) $[[\text{be in the audience}]] = [[\text{sit in Room 401}]] = \text{Figure 1c}$

Many declarative sentences (including examples 4 and 5) are referentially transparent in the sense that they allow their constituents' truth-preserving (*salva veritate*) substitution with a

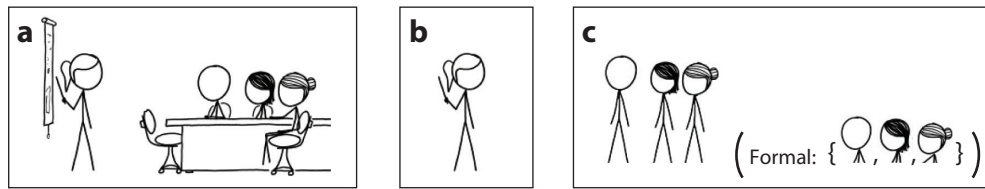


Figure 1

Circumstance of evaluation for examples 2 ([Penny] = [the speaker]) and 3 ([be in the audience] = [sit in Room 401]). Figure adapted from Munroe 2017 (CC BY-NC 2.5).

coextensional expression (Quine 1956). Specifically, in example 4, this truth preservation results from the coreferentiality of *Penny* and *the speaker* [and, hence, from the reference-preserving (salva denotatione) nature of their substitution; see example 2 (cf. Zimmermann 2005)]. An analogous observation (based on example 3) holds for item 5:

- (4a) [DP The speaker] is standing. ⇔ (4b) [DP Penny] is standing.
- (5a) Anna [VP is in the audience]. ⇔ (5b) Anna [VP is sitting in Room 401].

Some expressions block the truth-preserving substitution of coextensional expressions. These include propositional attitude verbs [e.g., *believe*, *wish*, *see (that)*] and intensional transitive verbs [e.g., *want*, *need*, *seek*; see Section 5]. Consider a scenario where Benno is unaware that Penny is, in fact, the department’s most recent hire. In this case, Benno can believe “the speaker is standing” without also believing “the department’s most recent hire is standing” (see example 6). Following Quine (1956), environments like that of example 6 are called referentially opaque:

- (6a) Benno believes that [DP the speaker] is standing. (T)
- (6b) [DP The speaker] is [DP the department’s most recent hire]. (T)
- (6c) $\not\Rightarrow$ Benno believes that [DP the department’s most recent hire] is standing. (F)

Opaque environments pose a serious challenge to referentialist semantics. This challenge is reinforced by the observation that some predicates (e.g., *want*, *look for*, *resemble*) need not be directed at a particular individual referent. Rather, they can be directed at an arbitrary member of the set that is denoted by the DP’s restrictor (in example 7a, *glass of water*; see D’Ambrosio 2019, Fodor 1970, Forbes 2000, Zimmermann 2001). Nonspecificity of reference can even occur independently of opacity, as evidenced by example 7 (inspired by Forbes 2006, p. 38):

- (7a) Minna (the dehydrated runner) needs [DP a glass of water].
- (7b) \Rightarrow Minna needs [DP a glass of H₂O]. (opacity: –)
- (7c) $\not\Rightarrow$ Minna needs [DP a certain glass of water]. (nonspecificity: +)

The nonspecific interpretation of *a glass of water* in example 7a is captured by the Quinean paraphrase of example 7a in example 8¹ and by the possibility of continuing example 7a with the expression *but no particular one* (proposed by D’Ambrosio 2019, p. 219; based on Fodor 1970):

- (8) Minna needs relief from dehydration.

¹Quine’s original paraphrase targets example 1b above (copied below as example *a), which he paraphrases as example *b (see Quine 1956, p. 177). Note, however, that Quine fails to distinguish between opacity and nonspecificity. Quine calls example *b the “notional” reading of example *a, and contrasts it with the relational reading:

1. (*a) I want a sloop. \equiv (*b) I seek (mere) relief from slooplessness.

1 (Referential)
Opacity: the property of resisting substitution of coextensional expressions
2 (Nonspecificity): the absence of a particular referent of the indefinite



Table 1 Verbs grouped by marks of intensionality

	① Transparency	① Opacity
② Specificity	Most commonly studied verbs (e.g., <i>pinch, kiss, kick, eat</i>)	Representational presuppositional verbs (e.g., <i>see, remember</i>)
② Nonspecificity	Verbs of absence (e.g., <i>need, avoid, miss</i>)	Search verbs (e.g., <i>seek, look for, hunt for</i>)
	Verbs of similarity (e.g., <i>resemble, simulate, imitate</i>)	Desire verbs (e.g., <i>want, prefer, hope for</i>)
		Fiction and depiction verbs (e.g., <i>imagine, paint</i>)

Sage shading indicates predicates that create intensional constructions.

A further challenge for referentialist semantics comes from the observation that, in opaque environments, upward-entailing DPs [especially proper names, (in)definites, and bare noun phrases] may fail to have any (specific or nonspecific) referent in the actual world (see Montague 1969, Quine 1960, Szabó 2005). Such a lack of existential import (i.e., emptiness) is illustrated by examples 9 and 10. The invalidity of the inference in example 9 is due to the observation that Minna’s needing a glass of water is compatible with there being no water (in the relevant circumstance):

- (9a) Minna needs [_{DPa} glass of water]. (example 7a)
- (9b) $\not\Rightarrow$ There is [_{DP}(a glass of) water]. (emptiness: +)

- (10) Tanner thinks that [_{DPa} unicorn] is dancing in his garden.
- (10a) $\not\Rightarrow$ Tanner thinks that [_{DPa} griffin] is dancing in his garden. (opacity: +)
- (10b) $\not\Rightarrow$ Tanner thinks that [_{DPa} certain unicorn] is dancing . . . (nonspecificity: +)
- (10c) $\not\Rightarrow$ There are unicorns. (emptiness: +)

Forbes (2006) calls the above properties—opacity, nonspecificity, and emptiness—“marks of intensionality.” **Table 1** lists some predicates that exemplify different combinations of these marks (or their absence). Since nonspecificity often coincides with emptiness (see examples 7, 9, and 10; pace Zimmermann 2010), the table omits emptiness.

A syntactic construction is commonly called intensional if it shows at least one of the above marks. A construction is extensional if it is not intensional—that is, if it creates a transparent environment that forces a specific, nonempty interpretation of its argument DPs. In **Table 1**, predicates that create an intensional construction appear in sage-colored cells. In the philosophical literature, intensional and extensional constructions are often described as having *de dicto* and *de re* readings, respectively.

2.2. Intensions

To capture opacity, nonspecificity, and emptiness, formal semanticists interpret the constituents of intensional constructions as more finely grained entities than extensions—for instance, as intensions (Carnap 1988) (or as hyperintensions; Cresswell 1975). Intensions stand in a many-to-one relation to extensions, such that coreferential or materially equivalent expressions may have different intensions. The finer grain of intensions straightforwardly explains the nonvalidity of the inference in example 6: Assuming that the *that*-clauses in constructions 6a/11a and 6c/11c have different intensions (see item 11b), they are not intersubstitutable in contexts (like the complement of *believe*) that require an intensional argument. Below, the intension of an expression *X* is

③ **Emptiness:** a lack of existential import of upward-entailing determiner phrases

Extensional construction: a construction that shows transparency, specificity, and nonemptiness

Intensional construction: a construction that shows at least one of the following properties: opacity, nonspecificity, and emptiness

Intension: the semantic value of an intensional construction and its constituents



written as $\llbracket X \rrbracket$. The intension of a declarative sentence or clause is called a proposition:

- a proposition
- (11a) believe (Benno, \llbracket that the speaker is standing \rrbracket)
 (11b) \llbracket that the speaker is standing $\rrbracket \neq \llbracket$ that the department's most recent hire is standing \rrbracket
 (11c) $\not\Rightarrow$ believe (Benno, \llbracket that the department's most recent hire is standing \rrbracket)

Proposition:
the intension of a declarative sentence or clause

Russellian ontology:
an ontology that contains as basic entities only individuals and propositions

Following the standard in semantics and the philosophy of language, this article treats propositions as sets of possible worlds (see Hintikka 1969, Montague 1970, von Stechow & Heim 2021). This treatment identifies the meaning of the *that*-clause in examples 6a and 11a with the set of possible worlds (or circumstances) w in which whoever happens to be the only speaker is standing. Since the speaker will be different from the department's most recent hire in some of these worlds (see the nonidentity in example 12), possible-worlds accounts of propositions straightforwardly block the inference in examples 6 and 11, thus capturing the referential opacity of *believe*:

- (12a) $\{w : (\text{the person who happens to be) the speaker in } w \text{ is standing in } w\}$
 (12b) $\neq \{w : (\dots \text{who happens to be) the department's most recent hire in } w \text{ is standing in } w\}$

Note that the result, example 13, of analyzing \llbracket that the speaker is standing \rrbracket as example 12a obtains the referent of the DP *the speaker* at worlds w , rather than at the actual world @. This allows for the possibility that the set of worlds in which “the speaker is standing” is true does not contain @. The nonexistence-at-@ of the referent of *the speaker* in these cases straightforwardly accounts for the possible emptiness of *the speaker*:

- (13) believe (Benno, $\{w : \text{the speaker in } w \text{ is standing in } w\}$)

The analysis in example 13 is further compatible with the speaker being a different individual in different worlds w . The absence of a particular individual who is standing in all world members of example 12a then captures the nonspecific interpretation of the DP *the speaker*.

Importantly, the ability to capture the different marks of intensionality is not unique to possible-worlds accounts. The different intensionality properties are also captured by many other accounts of intensions, including situation semantics (Barwise & Perry 1983, Kratzer 2002), impossible-worlds semantics (Jago 2014), and “primitive propositions” accounts (Thomason 1980). While my discussion treats propositions as sets of worlds, it is perfectly compatible with these other accounts. To emphasize my neutrality with respect to the analysis of intensions, I call the type of propositions p (for *propositions*) rather than $\langle s, t \rangle$ [for functions from worlds (type s) to truth values (type t); i.e., for characteristic functions of sets of worlds].

2.3. Intensional Ontologies: Russell Versus Frege-Church

Admittedly, to explain how the meaning of intensional constructions is obtained from the meaning of these constructions' constituents, intensional semantics must assume more types of intensions than only propositions: For example, interpreting sentence 6a requires—among others—first-order properties (i.e., functions from individuals to propositions; as the semantic values of *speaker* and *stand*), intensional generalized quantifiers (i.e., functions from properties to propositions; as the semantic value of *the speaker*), and relations between individuals and propositions (i.e., functions from propositions to sets of individuals; as the semantic value of *believe*). In **Figure 2**, Option 1, intensions are indicated by sage-colored shading.

The compositional semantics from **Figure 2**, Option 1, is in line with a Russellian ontology that builds all intensions from individuals (type e) and propositions (see Cresswell 1973,



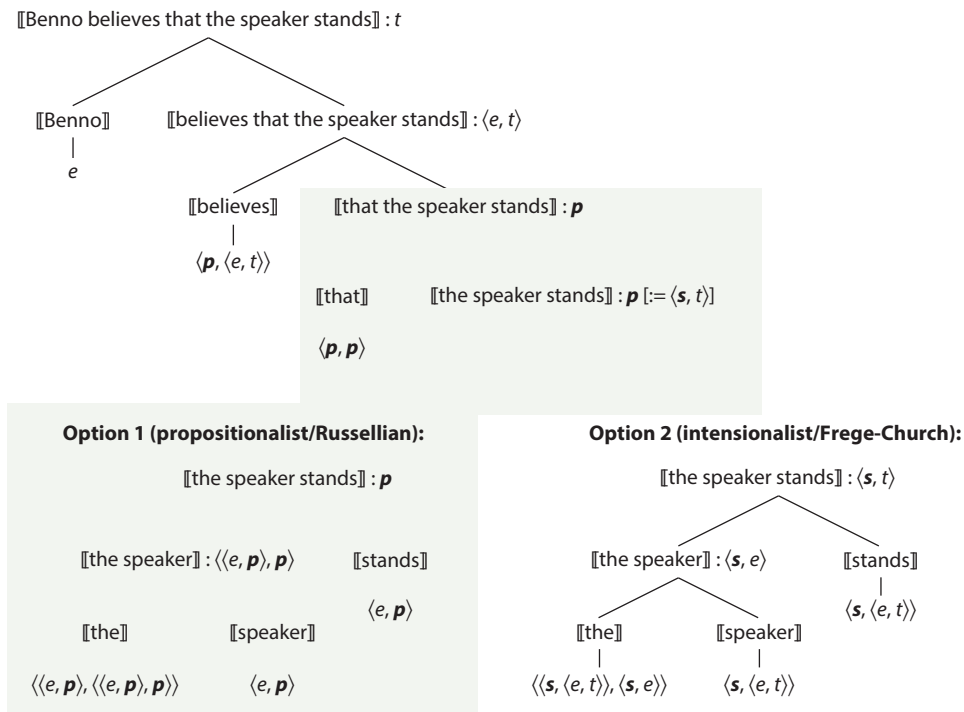


Figure 2

Compositional semantics of example 6a (Benno believes that _[DP]the speaker is standing). Intensions are indicated by sage-colored shading.

Kratzer 1991, Montague 1974).² With the exception of the semantic value of *believe*, the intensions in Figure 2, Option 1, are all propositional functions, which map *n*-tuples of entities (of possibly different types) to propositions (Kaplan 1976, p. 717; based on Russell 1903, 1905). Since multiary propositional functions can be coded as unary functions of a higher type,³ even the intensions of determiners are propositional functions (from pairs of type- $\langle e, p \rangle$ properties to a proposition).

The above raises the question (Q1; see the sidebar titled Propositionalist Questions) of whether all semantic values that figure in the compositional interpretation of intensional constructions are propositional functions (or constructions out of propositions).⁴ Frege-inspired semantics (see Groenendijk & Stokhof 1982, Montague 1973; based on Church 1951) answer this question in the negative. These semantics assume an intensional ontology built from Fregean senses (analyzed as type- $\langle s, \dots \rangle$ functions from worlds/circumstances to objects of any type, following Carnap 1988). While Russellian propositional functions are senses (viz., objects of type $\langle \dots, \langle s, t \rangle \rangle$ or $\langle s, \langle \dots, t \rangle \rangle$), many senses are not Russellian intensions. Examples include individual concepts (i.e., functions from circumstances to individuals, type $\langle s, e \rangle$), sets of individual concepts (type $\langle \langle s, e \rangle, t \rangle$),

Propositional functions: functions to propositions
Senses: functions from circumstances to objects

²For an introduction to Russellian and Frege-Church type theories, the reader is referred to the article in this volume by Sutton (2024).

³This proceeds by feeding the function its arguments one by one in inverse order, beginning with the last element of the *n*-tuple (see Curry 1961, Schönfinkel 1924).

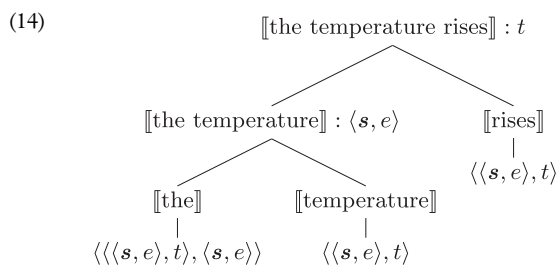
⁴Since propositions are commonly identified with zero-place propositional functions, propositional functions include propositions.

PROPOSITIONALIST QUESTIONS

- Q1. Are all intensional semantic values propositional functions? ➤ Yes: denotational propositionalism
- Q2. Are all intensional constructions relations to propositions? ➤ Yes: linguistic propositionalism
- Q3. What is the relevant notion of proposition? ➤ Option: perspectivism (Section 6.1)

and functions from circumstances to sets of individuals (type $\langle s, \langle e, t \rangle \rangle$). A compositional semantics for sentence 6a that uses Frege-Church’s intensionalist ontology is given in **Figure 2**, Option 2.

Item 14 provides an example (from Montague 1973, p. 239, attributed to Barbara Partee) that resists a straightforward Russellian interpretation (I will return to this example in Section 6.2):



In what follows, I call the view that denies the need for non-Russellian intensions denotational propositionalism.⁵ I call the opposite view—which affirms this need—denotational intensionalism. Propositionalism is the view, familiar from the semantic and philosophical literature, that all intensional constructions or intentional attitudes are relations to propositions (see, e.g., Forbes 2000, Grzankowski 2016, Montague 2007, Sinhababu 2015, Szabó 2005). Linguistic propositionalism is a specific instance of denotational propositionalism. I will discuss different varieties of propositionalism in Section 4. However, to show what is at stake in the propositionalism/intensionalism debate, I first present the arguments that have led researchers to adopt propositionalism.

3. ARGUMENTS FOR PROPOSITIONALISM

Arguments for propositionalism fall into empirical and methodological arguments. Methodological arguments include the greater parsimony of a propositionalist ontology (in comparison to a Frege-Church-style intensionalist ontology) and the availability of a uniform analysis of nominal and clausal intensional constructions. Empirical arguments include an easy account of the selectional flexibility between DPs and complementizer phrases (CPs) and of cross-categorical coordination and entailments.

3.1. Ontological Parsimony

I have already pointed out that Frege-Church’s intensionalist ontology contains many more (types of) objects than a Russellian ontology, including—among others—individual concepts and their properties. The greater parsimony of semantic theories with a Russellian ontology does not, by itself, make these the “better” theories. However, it allows for the following conditional claim: If it should turn out that all intensional constructions (like example 14) that have traditionally

Frege-Church ontology: an ontology that contains as basic entities individuals, truth values, and senses (i.e., functions from circumstances to objects, for each type)

⁵This terminology follows Zimmermann (2023b, personal communication).



been taken to require Frege-Church-style intensions can also be modeled using only propositions and propositional functions, then propositionalist semantic theories would be preferable over intensionalist theories (see Kaplan 1976).

Yet, the smaller number of intensional categories in propositionalist ontologies already has an adequacy-independent advantage. Since propositionism—unlike most forms of intensionalism—is not committed to ontologically uncanny entities like nonexistent objects (Meinong 1915, Parsons 1980) or their guises, it stands on a more solid ontological footing.

3.2. A Uniform Account of Intensionality

Another merit of propositionism lies in its ability to provide a uniform account of the intensionality of DP- and CP-embeddings (Larson 2002, Liefke 2022, Montague 2007). Specifically, by interpreting the intensional complements of verbs like *want* and *imagine* as propositions,⁶ propositionism gives the same explanation for the opacity, nonspecificity, and emptiness of intensional embeddings of DPs and CPs (see examples 11 and 12). For the nominal imagination report in example 15, this account is given in example 16a:

- (15) Enno is imagining $[_{DP} a \text{ unicorn}]_{de \text{ dicto}}$.
- (15a) $\not\Rightarrow$ Enno is imagining $[_{DP} a \text{ griffin}]_{de \text{ dicto}}$. (opacity: +)
- (15b) $\not\Rightarrow$ Enno is imagining $[_{DP} a \text{ certain unicorn}]$. (nonspecificity: +)
- (15c) $\not\Rightarrow$ There are unicorns. (emptiness: +)
- (16a) imagine (Enno, $\overbrace{\{w : a \text{ unicorn in } w \dots\}}^{\text{a proposition (!!)}} = \text{imagine (Enno, } \overbrace{[a \text{ unicorn } \dots]}^{\text{a proposition (!!)}})$
- (16b) For any R : $\{w : a \text{ unicorn in } w \text{ Rs in } w\} \neq \{w : a \text{ griffin in } w \text{ Rs in } w\}$
- (16c) $\not\Rightarrow$ imagine (Enno, $\{w : a \text{ griffin } \dots\}$)

In particular, the account in example 16a explains the referential opacity of *imagine* in sentences 15a and b through the existence of at least one world in which *unicorn* and *griffin* are not coreferential (such that some unicorn in this world is not a griffin in this world, or vice versa). The resulting nonidentity of the propositional interpretations of *a unicorn* and *a griffin* (see example 16b) then blocks the substitution of *a griffin* for *a unicorn* in example 16.

3.3. Nonpolysemous Semantics

Propositionalism is further supported by its ability to provide a uniform semantics for predicates (e.g., *see*, *remember*, *imagine*, *want*) that license both direct objects and clauses (Liefke 2021, Stephenson 2010; cf. Barwise 1981). Such selectional flexibility⁷ is witnessed by the pair of sentences in example 17 (based on example 15) and by the pair of sentences in example 18 (based on Quine 1956):

- (17a) Enno is imagining $[_{CP} \text{that a unicorn is cantering through a meadow}]$.
- (17b) Enno is imagining $[_{DP} a \text{ unicorn}]$.
- (18a) Will wants $[_{DP} a \text{ sloop}]$.
- (18b) Will wants $[_{CP} \text{to have a sloop}]$.

⁶Caveat: My present assertion of the advantage of propositionism is independent of a claim about the tenability of this analysis. The latter is the topic of Sections 5 and 6.

⁷The term “selectional flexibility” is taken from Theiler et al. (2019), who use it to describe the licensing behavior of responsive predicates (that accept both declarative and interrogative CPs).

Since intensionalist semantics interpret the embedded material in sentences 17a and b as different types of semantic values—namely, as a proposition (for sentence 17a) and as an individual concept (for sentence 17b)—they can explain the selectional flexibility of *imagine* only by assuming two different lexical entries (such that *imagine* is polysemous; see Mari 2016) or by assuming a covert type-shifter (along the lines of Partee 1987) that sends the individual concept [a unicorn] to a proposition (or propositional function) that serves as the argument of [imagine]. By interpreting constructions like sentences 17a and b uniformly as relations to propositions, propositionalist semantics straightforwardly account for the selectional flexibility of *imagine*.

3.4. Cross-Categorical Entailments

Because of its uniform interpretation of intensional complements—and given a Boolean (e.g., set-theoretic) structure on propositions—propositionalism also captures semantic inclusion relations between nominal and clausal constructions (Liefke 2021, Liefke & Werning 2018, Sinhababu 2015). These include the relation in example 19b, which validates the entailment from examples 19a–c (for details, see Liefke 2022, 2023b). This validation assumes that, for two expressions X and Y , $X \Rightarrow Y$ iff $[X] \subseteq [Y]$ (see Kac 1992, Keenan & Faltz 1985):

- (19a) Enno is imagining $[_{CP}(\text{that}) \text{ a unicorn (is) cantering}]$.
 (19b) i. $\{w : \text{ a unicorn in } w \text{ is cantering in } w\} = [_{CP} \text{ a unicorn (is) cantering}]$
 \subseteq ii. $\{w : \text{ a unicorn in } w \dots\} = [_{DP} \text{ a unicorn}]$
 (19c) \Rightarrow Enno is imagining $[_{DP} \text{ a unicorn}]$.

By employing the above devices, propositionalism can also explain the possibility of DP/CP coordinations like example 20 (see Bayer 1996, Liefke & Werning 2018, Sag et al. 1985):

- (20) Sunny sees $[_{DP} \text{ a penguin}]$; and $[_{CP} \text{ that Penny is taking pictures of it}_i]$.

The advantages of propositionalist semantics are summarized in the sidebar titled Merits of Propositionalism. Since the ability to account for the coordination of—and semantic inclusion between—a predicate's nominal and clausal complements is the direct result of a uniform semantics for DP and CP complements (see Section 3.3), I do not list this feature as a separate advantage.

4. VARIETIES OF PROPOSITIONALISM

I have suggested above that the strengths of propositionalism depend, to a large extent, on the particular form—or variety—of propositionalism and on this variety's ability to interpret the different intensional constructions. Below, I examine the adequacy and scope of the best-known such varieties (i.e., sententialism, paraphrasism, and logical propositionalism). However, before I do so, I first distinguish them from other kinds of propositionalism.

MERITS OF PROPOSITIONALISM

1. **Ontological parsimony:** Propositionalism assumes fewer (types of) intensional objects than intensionalism/Frege-Church ontologies.
2. **Uniform account of intensionality:** Propositionalism reduces the intensionality of nominal constructions to the intensionality of clausal constructions.
3. **Avoiding polysemy:** Propositionalism assumes the same entry for nominal and clausal uses of a predicate.



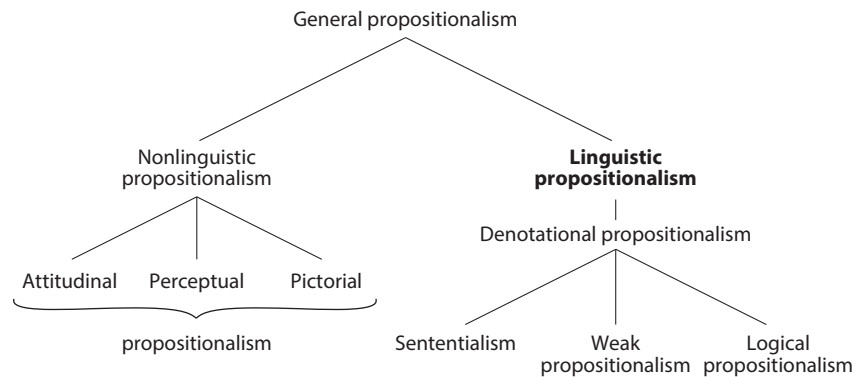


Figure 3

Varieties of propositionalism. These varieties include different versions of linguistic propositionalism (sententialism, weak propositionalism, and logical propositionalism) next to different versions of nonlinguistic propositionalism (attitudinal, perceptual, and pictorial propositionalism).

My discussion above has restricted propositionalism to intensional constructions. But propositionalism is also prominently held in the philosophy of mind and language—namely, as the more general thesis that all information content is propositional. This thesis has been advanced for the content of intentional mental states (↪ attitudinal propositionalism; see Liefke 2022, Montague 2007, Sinhababu 2015), for the content of perception (↪ perceptual propositionalism; see Byrne 2001, Speaks 2009, Tye 2002, as well as their early predecessor Cresswell 1983), and for the content of pictures (↪ pictorial propositionalism; see Abusch 2020, Greenberg 2013, Grzankowski 2015).

By assuming that all linguistic information content is propositional, the kinds of propositions that are the topic of this article are associated with instances of linguistic propositionalism. Linguistic propositionalism was first identified—and rejected—by Forbes (2000), who cited earlier propositionalist analyses by Quine (1956), Montague (1974), Fodor (1970), and Parsons (1997). More recently, it has been discussed by—among others—den Dikken et al. (2018), Szabó (2005), Maier (2006), Schwarz (2006), Deal (2008), and Zimmermann (2016). For reasons of economy, I will hereafter refer to linguistic propositionalism simply as propositionalism. A taxonomy of all propositionalist positions is included in **Figure 3**.

The varieties of linguistic propositionalism differ with respect to the level of linguistic analysis at which they obtain propositional content:⁸ While sententialism (den Dikken et al. 2018, Larson 2002; see also Parsons 1997) obtains this content at the level of syntax/logical form (viz., by analyzing intensional constructions in terms of an underlying clausal embedding), weak propositionalism (also called paraphrasism; Montague 1974, Quine 1956) obtains this content at the level of lexical semantics (viz., by lexically decomposing, or paraphrasing, the matrix verb through a construction involving a clause-embedding predicate). Logical propositionalism (Liefke 2020, 2022; Zimmermann 2023a) obtains propositional content at the level of formal, type-theoretic semantics (viz., by coding the value of the intensional complement as a proposition).

5. EXAMPLE PROPOSITIONALIST ANALYSES

The different varieties of linguistic propositionalism are reviewed below. To enable a comparison between these varieties, I apply them to three prominent cases of intensional constructions: desire and search reports, depiction reports, and experiential attitude reports.

⁸The terminology in this taxonomy follows Zimmermann (2023b, personal communication).

(General) Propositionalism: the view that all information content is propositional

Linguistic propositionalism: the view that all linguistic information content is propositional

Sententialism: the view that all intensional constructions have a clausal syntactic analysis

Weak propositionalism: the view that all intensional predicates lexically decompose into a clausal embedding

Logical propositionalism: the view that all intensional complements can be semantically coded as a proposition

5.1. Desire and Search Reports

Desire reports and search reports are constructions like examples 21 and 22, respectively, where the matrix verb combines with a direct DP object. Since this object can display substitution resistance and can receive a nonspecific or empty interpretation (see example 15), it resists interpretation as an extensional object (Forbes 2000, Montague 1969, Quine 1956, Zimmermann 1993). At the same time, the DP status of this object *prima facie* prevents its interpretation as a proposition:

- (21a) I want [_{DP}a sloop]. (Quine 1956)
 (21b) Max will need [_{DP}a bicycle] tomorrow. (Larson 2002)
 (22a) Jones seeks [_{DP}a unicorn]. (Montague 1969)
 (22b) Ernest is hunting [_{DP}lions]. (Quine 1956)

5.1.1. Weak propositionalist analysis of desire and search reports. To save the account of desire and search sentences as reports of “propositional attitudes,” Quine (1956, 1960) has proposed lexically decomposing the matrix verb of these reports into a construction that involves a clause-taking verb (indicated in boldface below; see also Montague 1974). This verb can be a different (*viz.*, clausal) use of the matrix verb from the original sentence (see *want* in example 23b), or it can be another clause-taking verb. In the latter case, the original matrix verb may still feature in the embedded clause (as in example 25) or may be dropped (as in examples 23c and 24). In the examples below, the verbs’ lexical decomposition is underlined:⁹

- (23a) I want [_{DP}a sloop].
 (23b) ≡ I **want/wish** [_{CP}to have [_{DP}a sloop]]. (Quine 1960)
 (23c) ≡ I **wish** [_{CP}that I have [_{DP}a sloop]]. (Quine 1956)
 (24a) Jones seeks [_{DP}a unicorn].
 (24b) ≡ Jones **tries** [_{CP}to find [_{DP}a unicorn]]. (Montague 1969)
 (25a) Ernest is hunting [_{DP}lions]. (based on Quine 1956,
 (25b) ≡ Ernest **strives/endeavors** [_{CP}that he hunts down [_{DP}lions/a lion]]. 1960)

Observe that the different uses of *want* in examples 23a and b semantically select for different intensional objects. Specifically, while *want* denotes a relation to an individual concept or intensional generalized quantifier in example 23a, it denotes a relation to a proposition in example 23b. As a result, only the lexical analysis (example 23b) of example 23a—but not its surface structure—is a case of propositional embedding. To avoid ambiguity, I hereafter mark objectual uses of selectionally flexible verbs like *want* with a subscript OBJ and mark propositional uses with a subscript PROP.

Notably, since *want* in example 23b is a control verb, its correct analysis is commonly taken to involve the silent pronoun PRO (see item 26a). Since this pronoun is obligatorily interpreted *de se* (in item 26b; see Chierchia 1989), the content of the complement of *want* in sentence 23b is a function from individuals to propositions¹⁰ (or a set of ordered pairs of worlds *w* and their individual centers *x*—i.e., a centered proposition; see Lewis 1979, Ninan 2010):

- (26a) I **want**_{PROP} [_{CP}PRO to have [_{DP}a sloop]].
 (≡ I **want**_{PROP} [_{CP}that [_{λx}₁. PRO has a sloop]].)
 (26b) [_{λx}₁. PRO has a sloop] = $\lambda x. \llbracket x \text{ has a sloop} \rrbracket = \{ \langle x, w \rangle : x \text{ has a sloop in } w \}$

⁹Quine’s original analysis of sentences like example 23a is “*w* wishes that $(\exists x)(x \text{ is asloop. } w \text{ has } x)$.”

¹⁰Montague (1970) equivalently interprets subjectless clauses as (type- $\langle s, \langle e, t \rangle \rangle$) functions from circumstances to sets of individuals.



Since item 26b is still truth-evaluable (viz., with respect to pairs $\langle x, w \rangle$), it does not pose a serious challenge for propositionalism. I discuss a generalization of propositionalism to de se content in Section 6.

The weak propositionalist analysis in items 23–25 is supported by the observation that the lower clause in the matrix verb's lexical decomposition can provide the antecedent for propositional anaphora (see example 27, due to den Dikken et al. 2018):

- (27) Joe wants [_{DP}some horses], but his mother won't allow it.
 (\equiv Joe wants some horses, but his mother won't allow that Joe has horses.)

It is further supported by the availability of different attachments for temporal adverbial modifiers. Thus, sentence 21b/28 is ambiguous between a modifier high-scope reading (item 28a, on which *tomorrow* modifies the matrix verb, *need*) and a modifier low-scope reading (item 28b, on which *tomorrow* modifies the implicit predicate *have*; see Larson 2002, McCawley 1974):

- (28) Max will need_{OBJ} [= need_{PROP} PRO to have] a bicycle tomorrow. (See example 23b.)
 (28a) Max's need for a bicycle will arise tomorrow. (✓)
 (28b) Max must have the bicycle tomorrow. (✓)

Interestingly, the above turns into a demerit for search reports, for whose occurrences with temporal modifiers weak propositionalism predicts unattested readings. This holds for the modifier low-scope reading of *yesterday* in example 29. In contrast to its high-scope counterpart (see example 29a), this reading is intuitively unavailable (Schwarz 2006; based on Partee 1974):

- (29) Jones sought [= tried PRO to find] a unicorn yesterday.
 (29a) Jones' seeking of a unicorn occurred yesterday. (✓)
 (29b) Jones' finding of a unicorn occurred yesterday. (✗)

Weak propositionalism is further challenged by the observation that many desire and search reports display a different syntactic behavior from their overtly clausal counterparts. Thus, while a passive can front the object DP of a desire verb (as is the case in example 30a), it cannot front this DP in the clausal paraphrase (see example 30b; Larson 2002, p. 235):

- (30a) [_{DP}A bicycle]_I is needed_{OBJ} t_1 by Max.
 (30b) *_{[DP}A bicycle]_I is needed_{PROP} [_{CP}PRO to have t_1] by Max.

Another major challenge for weak propositionalism comes from the observation that the lexical decomposition of many desire verbs varies with the particular linguistic and nonlinguistic context. Thus, while *want*_{OBJ} is adequately decomposed as 'want_{PROP} to have' in example 21a, it requires an analysis as 'want_{PROP} to drink' in sentence 31 and as 'want_{PROP} to run' (or 'want_{PROP} to watch') in sentence 32 (based on Schwarz 2006, p. 272):

- (31) John needs_{OBJ} $\left\{ \begin{array}{l} \text{i. = ?? needs}_{\text{PROP}} \text{ PRO to have} \\ \text{ii. = } \checkmark \text{ needs}_{\text{PROP}} \text{ PRO to drink} \end{array} \right\}$ a coffee.
 (32) John needs_{OBJ} $\left\{ \begin{array}{l} \text{i. = ?? needs}_{\text{PROP}} \text{ PRO to have} \\ \text{ii. = } \# \text{ needs}_{\text{PROP}} \text{ PRO to drink} \\ \text{iii. = } \checkmark \text{ needs}_{\text{PROP}} \text{ PRO to run/watch} \end{array} \right\}$ a marathon.

In virtue of the above, paraphrases of some desire reports are not lexically determined—as Quine (1956) would have it—but are contextually provided (see Schwarz 2006).

5.1.2. Sententialist analysis of desire and search reports. To defend propositionalism against the above challenges, Larson (2002) and den Dikken et al. (2018) have proposed a restructuring analysis of sentence 21b (based on the phenomenon of restructuring in Romance languages; see Baker 1988). This analysis assumes that the infinitival complements of restructuring verbs (e.g., *need*) involve a form of verb incorporation of the embedded predicate in the matrix verb. For a modifier-free variant of sentence 21b (without *tomorrow*), this incorporation is shown below. Following Szabó (2005), I write implicit material in small capitals:

- (33a) Max needs [_{CP}[PRO]<sub>[VP HAVE a bicycle]]].
 (33b) Max needs [_{CP}[_{VP HAVE a bicycle}] [PRO *t*]]. (VP raises to the front of the CP)
 (33c) Max needs-HAVE [_{CP}[_{VP *t*}] a bicycle] [PRO *t*]]. (lower V adjoins to the matrix V)
 (33d) Max needs-HAVE-a bicycle [_{CP}[_{VP *t*}] [PRO *t*]]. (*a bicycle* moves into matrix clause)</sub>

Den Dikken et al. (2018) have extended this analysis to English search verbs.

Larson's (2002) restructuring analysis has some specific advantages over lexical decomposition of desire verbs. In particular, since this analysis raises *a bicycle* in sentence 21b into the matrix clause (see item 33d), it allows that *a bicycle* is fronted by the passive in sentence 30a. This differs from the occurrence of *a bicycle* in propositional report 28. The fact that the CP in this report has not undergone restructuring then explains the deviance of example 30b. By emphasizing that the complements of restructuring verbs of the *try*-class lack an independent tense specification (see Wurmbrand 1997), sententialism can further account for the intuitive unavailability of the reading in example 29b. It is challenged by the observation that some search verbs (e.g., *bunt* in example 22b) are not restructuring verbs.

5.1.3. Logical propositionalist analysis of desire and search reports. I have suggested above that the propositional status of nonclausal intensional complements may also be obtained by type-shifting the complement's semantic value to a proposition. However, for desire and search verbs, this proves to be difficult. This is due to constraints on admissible type-shifts, which include—among others—injectivity and topic-neutrality (van Benthem 1991). Specifically, in virtue of topic-neutrality, this type-shift may not send individual concepts *c* to centered propositions $\{\langle x, w \rangle : xRs\ c(w)\ \text{in}\ w\}$, where *R* is a contentful relation between individuals (e.g., 'have' or 'drink'). Because of injectivity, this shift must preserve all distinctions from the original domain. To make this possible, the range of this type-shift must have a larger cardinality than its domain. Yet, given the standard assumption that there are more individuals than the two truth values (such that there are more individual concepts than possible-worlds propositions), this is not the case. One could try to solve this problem by representing individual concepts *c* as centered propositions of the form $\{\langle x, w \rangle : x = c(w)\}$. But this representation fails to capture the intuitive difference between reports like examples 34a and b (see Montague 2007; cf. this article's Section 6.1). A similar observation blocks the generalization of propositions to Zimmermann-style properties (see Zimmermann 1993, 2016):

- (34a) Winnifred wants_{OBJ} [a unicorn].
 (34b) Winnifred wants_{PROP} [to be a unicorn].

I will present a class of intensional constructions that allow for a logical propositionalist analysis in Section 5.3. However, to fully assess the strengths and weaknesses of sententialism and weak propositionalism, I first turn to propositionalist analyses of another class of intensional transitive constructions—namely, depiction reports.



5.2. Depiction Reports

Depiction reports are constructions like example 35 whose object DPs can be used to describe the content of pictures and mental images (Forbes 2006, chapter 7; Larson 2002, Moltmann 2008, Zimmermann 2016). Because these DPs display all marks of intensionality, they pose a similar challenge to the DPs in desire and search reports:

- (35a) i. Penny painted [_{DP}a penguin]_{de dicto}
 ii. Penny painted a picture of some penguin (or other). (Zimmermann 2016)
 (35b) Max pictured/visualized/conceived of [_{DP}a new bicycle]. (Larson 2002)
 (35c) Mary imagined [_{DP}a unicorn]. (Parsons 1997)

5.2.1. Weak propositionalist analysis of depiction reports. Weak propositionalist accounts attempt to capture the intensional behavior of these DPs by lexically decomposing the matrix verb in these reports in terms of a clause-embedding predicate (see Section 5.1.1). However, as Schwarz (2006) has observed for desire verbs (see examples 31 and 32), the lexical decomposition of depiction verbs is not unique. For example, researchers have proposed the following paraphrases for sentence 35c:

- (36a) [?]Mary **seemed** [_{CP}PRO to see [_{DP}a unicorn]]. (Montague 1970)
 (36b) [?]Mary **pretended** [_{CP}PRO to see [_{DP}a unicorn]]. (White 1989)
 (36c) [?]Mary **imagined**_{PROF} [_{CP}PRO seeing/hearing/... [_{DP}a unicorn]]. (Vendler 1979)

Apart from the doubtful adequacy of these paraphrases (see the question marks preceding the above), the absence of a unique lexical decomposition seriously impedes learnability. The difficulty of giving suitable paraphrases is already observed by Montague (1969, p. 168):

[For] ‘seeks’ and ‘owes’ . . . circumlocution involving infinitives is possible. It is not, however, in the case of all English verbs sharing the logical peculiarities of ‘seeks’ and ‘owes’, despite the apparent contention to the contrary in Quine [1960]; four counter-examples are ‘worships’, ‘conceives’, ‘is about’ and ‘thinks of’.

5.2.2. Sententialist analysis of depiction reports. Pursuing a sententialist analysis, den Dikken et al. (2018) have proposed treating the verbal complements in example 35 as small clause structures with a concealed predicate *X*. For examples 35c and b, the result of this treatment is given below:

- (37) Mary imagined [[_{DP}a unicorn] IN HER GARDEN].
 (38) Max pictured [[_{DP}a new bicycle] IN HIS GARAGE].

Similar analyses to the above have been proposed by Schwarz (2006) (who assumes that the small clause complement contains a contextually supplied predicate) and by D’Ambrosio & Stoljar (2021) (who assume that *X* is a free adjunct that is contextually supplied and can be dropped; see Williams 1983).¹¹

To bypass sententialism’s restriction to restructuring verbs, Parsons (1997) has proposed analyzing the object DP in examples 35a–c as the result of eliding the infinitive *to be* (or *to be there*) from a clausal complement (for sentence 35c: from the CP *a unicorn to be*; see example 39).¹² Reflecting the particular elided predicate, *be*, this account has been dubbed “Hamlet ellipsis”

¹¹Note, however, that a nonclausal syntax is, strictly speaking, incompatible with sententialism.

¹²While item 39 may be “bad English” (Quine 1960, p. 137), it is still grammatical. To see this, consider the similarly structured report *Mary imagined a unicorn to be cantering through a meadow*.



Figure 4

Detail from *Jacob's Dream* (Ferdinand Bol, ca. 1642). Painting, oil on canvas. Image retrieved May 5, 2023, from Wikimedia Commons (https://commons.wikimedia.org/wiki/File:Ferdinand_Bol_-_Jacob's_Dream_-_WGA02362.jpg).

(Parsons 1997, p. 375). Since Parsons's account uses the same predicate in the analysis of depiction reports with different matrix verbs, it provides a systematic, uniform account of these reports:

- (39) Mary imagined $[_{CP}[_{DP}a \text{ unicorn}] \text{ TO BE THERE/TO EXIST}]$.
 (\equiv Mary imagined $[_{CP} \text{ THERE TO BE } [_{DP}a \text{ unicorn}]]$.)

The above notwithstanding, Hamlet ellipsis has been argued to face a number of challenges. These include unattested readings of depiction reports with temporal modifiers (analogous to example 29; see Forbes 2006, p. 63). They further include the prediction of counterintuitive truth conditions: Parsons's (1997) account suggests that sentence 35c receives the interpretation below (based on the analysis in example 39):

- (40) imagine (Mary, $\{w : \text{there is a unicorn in } w\}$)

However, a semantics like the above conflicts with the observation that—in concealed attitude reports like sentence 41a—the DP is intuitively interpreted in the possible worlds that are associated with the concealed (!) attitude (see Zimmermann 2016). To see this, consider sentence 41a, as used to describe the content of Ferdinand Bol's painting *Jacob's Dream* (shown in **Figure 4**). On this use, the DP *an angel* is intuitively not interpreted at Ferdinand's paint-worlds w (see example 41b, analogous to example 40) but at Jacob's dream-worlds w' , in contrast to what is predicted by Parsons:

- (41a) Ferdinand painted $[_{CP} \text{ THERE TO BE } [_{DP} \text{ an angel}]]$. (Zimmermann 2016)
 (\equiv Ferdinand painted $[_{CP} \underbrace{\text{Jacob dreaming about } [_{CP} \text{ THERE BEING } [_{DP} \text{ an angel}]]}_{\text{concealed attitude}}]$.)
- (41b) paint (Ferdinand, $\{w : \text{there is an angel in } w\}$)

Semantics that are based on Parsons's (1997) account further fail to block intuitively invalid inferences like the one in example 42 (see Zimmermann 2016). Specifically, on this account, the inference in example 42 is validated by the assumption that every world in which there exists a live

unicorn is a world in which there exists a unicorn heart (see item 42b):

- (42a) Mary imagined [_{CP}~~THESE TO BE~~ [_{DP}a live unicorn]].
 (42b) $\{w: \text{there is a live unicorn in } w\} \subseteq \{w: \text{there is a unicorn heart in } w\}$
 (42c) $\not\Rightarrow$ Mary imagined [_{CP}~~THESE TO BE~~ [_{DP}a unicorn heart]].

For a logical propositionalist attempt to save Parsons's (1997) account against these challenges, the reader is referred to Liefke (2020).

5.3. Experiential Attitude Reports

My discussion above has focused on intensional transitive verbs or on transitive occurrences of intensional verbs. As a member of the class of experiential attitude verbs (Liefke 2022, 2023a), *imagine* also combines with small clause complements (as is illustrated in example 43c). These complements are typically taken to denote not propositions but rather (situations or) events (see, e.g., Barwise 1981, Grimm & McNally 2015, Higginbotham 2003). Their eventive status is evidenced by the possibility of replacing these complements by an explicitly event-denoting expression (as in example 43c, i; Liefke 2022) and of modifying them through a viewpoint adjunct or a perspectival locative modifier (as in example 43c, ii; D'Ambrosio & Stoljar forthcoming, Vendler 1979):

- (43a) Ronny remembers [_{SC}a woman being chased by a squirrel]. (Liefke 2023a)
 (43b) Ralph saw [_{SC}a spy hiding a letter under a rock]. (Barwise 1981)
 (43c) Enno is imagining [_{SC}a unicorn cantering (through his garden)].
 i. Enno is imagining [_{DP}**an event in which** [a unicorn is cantering]].
 ii. Enno is imagining [_{SC}a unicorn cantering]**from a bird's eye perspective**.

Logical propositionalism defends the propositional nature of the semantic complement in sentences 43a–c by coding the situation, σ , that serves as the intuitive complement by a set of possible worlds [see item 44a, where \leq is Kratzer's (2002) spatio-temporal inclusion ordering on situations that has possible worlds as its maximal elements]:

- (44a) $\{w: \sigma \leq w\}$
 (44b) $[\text{remember}_{\text{EXP}}] = \lambda\sigma \lambda x. \text{remember}(x, \{w: \sigma \leq w\})$
 (45) Ronny remembers [_{CP}what [_{SC}a woman being chased by a squirrel] was like (to him)].

Liefke (2022) has proposed building this *s-to-p* coding directly into the semantics of experiential uses of *imagine* and *remember* (see example 44b). D'Ambrosio & Stoljar (2021) have put forth a syntactic version of this approach that obtains example 44a as an answer to the concealed question interpretation of the small clause (for the small clause in example 43a: example 45). Since these approaches interpret superficially direct objects (or small clauses) and *that*-clauses in the same type (viz., as propositions), they can straightforwardly capture entailments like the one in example 46:

- (46a) Ronny remembers [_{DP}a woman] being chased by a squirrel].
 (46b) $\not\Rightarrow$ Ronny remembers [_{CP}that [_{DP}a woman] was being chased by a squirrel].

D'Ambrosio & Stoljar's (2021) strategy even applies to some superficially transitive uses of these verbs (see example 47a). A similar observation holds for Liefke (2022), who does, however, not rely on a concealed question analysis:

- (47a) Ronny remembers [_{DP}a/the woman].
 (47b) \equiv Ronny remembers [_{CP}what [_{DP}the woman] looked/sounded like (in the contextually relevant situation, viz. when she was chased by the squirrel)].

6. CHALLENGES AND PROSPECTS

My discussion above has presented a divide-and-conquer approach to propositionalism. While this approach is surprisingly successful in quite a few instances (see especially examples 33 and 47a), it seems unavailable for some hard cases. I close this article by presenting two paradigmatic examples of such cases and discussing their prospects for future research.

6.1. Reports of Irreducibly Objectual Attitudes

The possibility of applying the approach from Section 5.3 to DPs like *a woman* in sentence 47a raises the hope that it can also be used as a more general propositionalist strategy. However, a closer look at cases like example 47 already dampens this hope: Since it requires that the report be equivalent to an explicitly eventive report of the form of example 48, this approach is unavailable for cases in which the agent holds the relation to the object itself—independently of the event in which this object features or of the properties that it exemplifies in this event:

(48) For some property P , Ronny remembers $[_{DP}\text{an event in which } [_{DP}a\text{ woman}] \text{ had } P]$.

Similar observations hold for the possibility of supplementing the direct object in objectual attitude reports with a contextually given predicate (Grzankowski 2016, Szabó 2005). This even holds for supplementing the lexically “poor” predicate *be there* (pace Parsons 1997; see Section 5.2.2). For example, in sentence 49a, John might not like Mary’s exemplifying any particular property (including her existence) but only like Mary herself (see Grzankowski 2016, p. 829). In this scenario, sentence 49b is false for any instance of P and, hence, not equivalent to sentence 49a:

(49a) John likes $[_{DP}Mary]$.

(49b) \neq For some property P , John likes $[_{CP}\text{that } [_{DP}Mary \text{ has } P]]$.

To provide a compositional semantics for sentences like example 47a, Zimmermann (1993) (see de Swart 2000, van Geenhoven & McNally 2005) has proposed interpreting the object DPs of intensional transitive verbs as the property that is denoted by the restrictor noun of these DPs [for example 47a: by the type- $\langle s, \langle e, t \rangle \rangle$ property ‘woman’ (see example 50b) or ‘be a woman’ (see example 50a)]. These properties can even be coded as Russellian propositional functions (viz., through the type-shifter $\lambda P\lambda x. \{w: P(w)(x) = \mathbf{T}\}$):

(50a) $\text{remember}(\text{Ronny}, \lambda w. \{x : x \text{ is a woman in } w\}) \equiv (50b) \text{ remember}(\text{Ronny}, \text{woman})$

(50c) $\text{remember}(\text{Ronny}, \lambda x. \{w : x \text{ is a woman in } w\})$

Importantly, attitudes toward propositional functions may still resist a reduction to propositional attitudes (see Montague 2007, anticipated in Montague 1969). This holds for attitudes (e.g., the attitudes reported through examples 47a and 49a) that do not allow a *de se* interpretation. The latter is an interpretation on which the attitude holder self-ascribes a property (Lewis 1979, Chierchia 1989). While such self-ascription yields intuitive truth conditions for sentences like example 26 (see item 51), it produces implausible conditions for sentence 47a (see item 52):

(51a) $[[\text{Winnie wants}_{\text{PROP}} [_{CP}\text{PRO to have } [_{DP}a \text{ sloop}]]]]$

(51b) $\equiv \text{want}(\text{Winnie}, \{(x, w) : x \text{ has a sloop in } w\})$

[Interpretation: Winnie stands in the ‘wanting’-relation to worlds in which he
(/his counterpart) exemplifies the property of having a sloop.] (✓)



Propertyism: the view that some intensional complements are irreducibly properties

Perspectivism: the view that all intensional complements can be reduced to centered propositions

- (52a) \llbracket Ronny remembers $[_{DP}$ a woman \rrbracket
 (52b) \equiv remember (Ronny, $\{(x, w) : x \text{ is a woman in } w\}$)
 [Interpretation: Ronny stands in the ‘remembering’-relation to worlds in which he (/his counterpart) has the property of being a woman.] (X)

Note that attributing the property to a different object than the attitude holder (in example 53: to Mary) or replacing it with a more specific subproperty (Zimmermann 2006) does not solve the problem. This is so since, in example 52a, there is no independently identifiable object [unlike Mary in example 53a or Bill’s belief-world(s) in example 54a] to which the property can be attributed:

- (53a) \llbracket John asked $[_{DP}$ Mary \rrbracket $[_{PRO}$ to marry him \rrbracket
 (53b) \equiv ask (John, Mary, $\{(x, w) : x \text{ marries John in } w\}$)
 (54a) \llbracket Bill wishes $[_{CP}$ that the robber-in- $PRO_{w'}$ had not robbed \rrbracket (see Blumberg 2018)
 (54b) wish (Bill, $\{(w', w) : \text{the robber in } w' \text{ has not robbed in } w\}$)

In what follows, I call the view that some attitudes are irreducibly relations toward properties “propertyism.” Zimmermann (2023b) has recently called a version of logical propositionalism that identifies the relevant notion of proposition with centered propositions “perspectivism.” The difference between item 52 and items 51, 53, and 54 suggests that perspectivism is restricted to propositions (in a generalized sense of “proposition” that includes propositional functions) that are straightforwardly truth-evaluable—though this evaluation may involve further parameters like individual centers (see items 51 and 53) and additional worlds (see item 54; Torre 2010). The identification of these parameters is an important topic for future work.

6.2. Reports of (Temporal) Change

Observe that propertyism—but expectedly not perspectivism—also provides an adequate semantics for the subject DPs in reports of temporal change. Such reports are sentences like example 55a (Montague 1973, p. 239, attributed to Barbara Partee) whose extensional interpretation validates counterintuitive inferences like the one in example 55:

- (55a) $[_{DP}$ The temperature \rrbracket is rising.
 (55b) $[_{DP}$ The temperature \rrbracket is ninety.
 (55c) $\not\Rightarrow$ Ninety is rising.

To block this inference, Montague (1973) interprets the subject *the temperature* in sentence 55a as an individual concept (type $\langle s, e \rangle$; see the semantic tree in example 14). However, Kaplan (1976, p. 728) has already shown that individual concepts c can be coded as propositional functions $\lambda x. \{w : c(w) = x\}$.

The possibility of interpreting *the temperature* in an intensionalist or a propositionalist type again raises the question of whether propositionalism is a position worth defending. Given that most intensional constructions have a simpler¹³ Frege-Church-style interpretation (with less complex, i.e., lower-rank types; see example 14), one may wonder whether, at the end of the day, propositionalism is really preferable to intensionalism. Setting aside the arguments for propositionalism from Sections 3.2–3.4—which provide substantial support for propositionalism—the choice between intensionalism and propositionalism then boils down to a higher valuing of

¹³For example, the type of individual concepts has a strictly lower rank (viz., 1) than the type of one-place propositional functions (viz., 2).

simplicity or of parsimony: While a lover of “desert landscapes” (Quine 1948) will opt for a Russellian propositionalist semantics, the complexity-conscious will likely stick to Frege-Church-style intensionalist accounts.

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